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## PART 16 – MINE SHAFTS AND HOISTS

### DEFINITIONS

**16.01** In this part, the following definitions apply:

“bulkhead”

means a structure built to impound water, compressed air, hydraulic backfill or any other material in an underground opening where the potential pressure against the structure will be in excess of 100 kPa (14 lb. per sq. in.);

“shaft or winze”

means an excavation of a limited perimeter compared with its depth in which persons and material are transported by a mine hoisting plant.

### RAISING

- Compartmentments in raises** **16.02** (1) Except where approved raise climbing equipment is used, all raises in a mine or project inclined over 50 degrees from horizontal and longer than 18 m (60 ft.) in length along the slope shall be divided into at least two compartmentments, one of which shall be maintained as a manway with suitable ladders.
- Timbers in raises** (2) Timbering shall be maintained within a safe distance of the face and in no event shall the distance between the face and the top of the timbering exceed 7.5 m (25 ft.).
- Raises covered** (3) The tops of all raises or other openings to a level shall be kept securely covered, fenced off or protected by suitable barricades to prevent inadvertent access.
- Raise climber brakes** **16.03** A power-driven raise climber used in a mine or project shall
- (a) have at least two independent means of braking,
    - i. one that is as close as practicable to the final drive of the motor,
    - ii. each capable of stopping and holding the climber with its maximum rated load, and
    - iii. arranged to permit independent testing,
  - (b) have a maximum load that it may carry as certified by the manufacturer displayed on the climber or at the raise service position,
  - (c) be operated within the maximum load limit,
  - (d) have a stop block to prevent the climber being taken beyond the track, except when the track on which it operates is being extended, and
  - (e) have an effective means for communication between the climber and the raise service position.
- Raise climber load**
- Raise climber stop block**
- Raise climber communication**
- Voltage**
- Ground fault**
- Electric switches**
- Power disconnected** **16.04** An electrically powered raise climber used in a mine or project shall
- (a) not be operated with a power supply in excess of 750 volts,
  - (b) be protected by a ground-fault system,
  - (c) have a visible break switch at the raise service area by which its power supply can be isolated,
  - (d) have a switch at the raise service area by which its supply power can be safety interrupted,
  - (e) have a control switch on the climber by which power to its motor can be removed, and
  - (f) have the power supply disconnected while explosives and electric caps are being loaded into position for blasting.

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| <b>Reaching workers</b>     | <b>16.05</b> | (1) Workers in a mine or project shall be provided with a means by which they can be reached and removed from a raise climber.   |
| <b>Inspection</b>           |              | (2) A competent person shall examine devices that may affect the safe operation of a raise climber <ul style="list-style-type: none"> <li>(a) before the raise climber is first used at the raise and daily thereafter when in use, and</li> <li>(b) during every major overhaul of the raise climber.</li> </ul>  |
| <b>Major overhaul</b>       |              | (3) A major overhaul of a raise climber shall be performed at the frequency recommended by the raise climber's manufacturer or a competent person, whichever is more frequent.   |
| <b>Cleaning</b>             |              | (4) A raise climber being used at a raise shall be thoroughly cleaned weekly.  |
| <b>Brake control test</b>   |              | (5) The brakes and controls of the raise climber shall be tested prior to first being used during a work shift.  |
| <b>Non-destructive test</b> |              | (6) A qualified person shall examine the main shaft of the drive train of a raise climber using a non-destructive method to determine if the main shaft is in sound condition <ul style="list-style-type: none"> <li>(a) before the raise climber is first put into service, and</li> <li>(b) during every major overhaul of the raise climber, and</li> <li>(c) not less frequently than once for every 4,000 hours of use.</li> </ul>  |
| <b>Log book</b>             |              | (7) Each raise climber shall have a log book that contains a record of the dates that the examinations required by subsections (2), (3), (4), (5) and (6) are performed and including <ul style="list-style-type: none"> <li>(a) the findings of each examination,</li> <li>(b) a record of any repairs and modifications, and the signature of the person performing such examinations, repairs and modifications, and</li> <li>(c) the signature of the supervisor authorizing the repairs and modifications.</li> </ul> |

**STOPPING**

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| <b>Second exit</b>         | <b>16.06</b> | (1) Before stopping is started in any part of a mine or project, a second or auxiliary exit shall be provided to the working place in that stopping block.  |
| <b>Cyanide in tailings</b> |              | (2) The cyanide content in the liquid portion of the tailings used for underground fill and in the effluent from the filled area shall be less than 20 milligrams per litre expressed as cyanide.   |
| <b>Pulling chutes</b>      | <b>16.07</b> | (1) Whenever chutes are pulled where persons in the stope are working or may enter at the time of pulling <ul style="list-style-type: none"> <li>(a) the pulling area in the stope shall be marked by signs, or persons working in the vicinity shall be notified, and</li> <li>(b) as pulling proceeds, proper precautions shall be taken to ascertain that the broken material is settling freely.</li> </ul> |
| <b>Hang-ups</b>            |              | (2) When there is any indication of a hang-up, the location shall be adequately protected by suitable signs or barricades.  |
|                            |              | (3) No person shall enter or be permitted to enter any chute or transfer raise used for the passage of ore, rock or other material where the material is hung up.   |
| <b>Covered openings</b>    |              | (4) The top of every mill hole, manway or other opening shall be kept covered or otherwise adequately protected.  |

- (5) Where persons are working below a haulage or travelway and the workplace is open to the haulage or travelway, the opening shall be securely covered or otherwise closed off from the haulage or travelway.

#### **VENTILATION AND HEATING**

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| <b>Fan structures</b>                  | <b>16.08</b> | (1) All structures in a mine or project that contain primary fans used in connection with underground ventilation shall be constructed to minimize the fire hazard and the installations shall be equipped with a warning device in the event of a malfunction.  |
| <b>Heating air</b>                     |              | (2) Any proposed method of heating the underground ventilating air shall be submitted to the director for acceptance.  |
| <b>Direct-fired heater</b>             |              | (3) Any proposed method of heating air in underground workings using a direct-fired heater shall use a design certified by the Canadian Standards Association and subsequent acceptance shall be given by the director.  |
| <b>Ventilation provided</b>            | <b>16.09</b> | (1) Ventilation shall be provided and maintained in every part of an underground workplace.  |
| <b>Battery-charging area</b>           |              | (2) An underground battery-charging station shall be well ventilated to prevent the accumulation of an explosive mixture of gases.   |
| <b>No ventilation</b>                  |              | (3) An underground area that is not ventilated by an underground ventilation system shall be <ul style="list-style-type: none"> <li>(a) effectively barricaded to prevent inadvertent entry, and</li> <li>(b) posted with signs to warn that entry is prohibited.</li> </ul>   |
| <b>Out-of-service areas</b>            |              | (4) Underground workings, especially raises, shafts and sumps that have not been used for some time, shall be examined prior to use to ascertain whether the air is deficient in oxygen or has accumulations of dangerous gases.   |
| <b>Worker protection</b>               |              | (5) Workers in a mine or project required to make the examination in subsection (4) shall be appropriately trained and protected.  |
| <b>Flammable gases</b>                 |              | (6) Where methane or other flammable gases are found in percentages exceeding 0.75 percent by volume in the operating area of any mine or project, the ambient air shall be tested at least once per week.   |
| <b>Development heading ventilation</b> | <b>16.10</b> | (1) Development headings shall be advanced no further from the through-air current than the distance prescribed by a ventilation engineer, other competent person or the director, unless ventilating equipment is installed which delivers air to the face with sufficient volume and velocity to provide adequate ventilation. |
| <b>System failure</b>                  |              | (2) Where a ventilation system ceases to function, all diesel engines shall be shut down immediately and not restarted or used, except for emergency evacuation of workers, until the ventilation system is functioning effectively.   |

#### **SHAFT-SINKING**

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| <b>Casing, lining</b> | <b>16.11</b> | (1) Every shaft and winze of a mine or project shall be securely cased, lined, or timbered and during sinking operations the casing, lining, or timbering shall be maintained within a safe distance, not exceeding 15 m (50 ft.) from the bottom. |
| <b>Guides</b>         |              | (2) Guides, guide attachments and shaft casing, lining or timbering shall be designed, installed and maintained so the safety catches grip the guides properly at any point in the shaft.  |

- Work in shaft** (3) During shaft-sinking operations, no other work shall be performed in a shaft or winze while a worker is working below, unless a well-designed and constructed cover is provided to protect the worker from the danger of falling materials.
- Ladders** (4) During shaft-sinking operations, if a permanent ladder is not installed to the bottom, an auxiliary ladder shall be provided from the permanent ladders to the bottom in a way that the ladder can be promptly lowered to any point at which a worker is working.
- Material on conveyance** **16.12** (1) Where steel, timber, or other materials are being transported in a shaft conveyance, they shall be placed in a manner to prevent them from shifting and, where necessary, shall be secured to the conveyance.
- (2) When materials being transported project above the sides of the conveyance, they shall be securely fastened to the conveyance or lashed to the hoisting rope to prevent damage to the rope or entanglement with the walls of the shaft or winze.
- (3) A bucket or skip used for transporting waste rocks or minerals shall be filled in a manner to ensure that pieces of loose rock or minerals do not fall from the bucket or project above the brim.
- Workers in bucket / skip** (4) During a shaft- or winze-sinking operation, a bucket or skip carrying workers shall not be lowered within 15 m (50 ft.) of the blasting set or bulkhead after a blast without a careful examination of the surrounding environment.
- (5) The bucket or skip shall only be lowered beyond the point referred to in subsection (4) on a signal from the workers in the bucket or skip and at a speed that is fully under the control of those workers.
- Inspection trip** (6) Only workers required to conduct the examination of the shaft or winze structure and its environment shall be carried on the initial trip.
- Signed near bottom** (7) In a shaft or winze sinking operation, a bucket or skip shall be lowered and held at least 4.5 m (15 ft.) from the shaft or winze bottom until a distinct signal is given by the person in charge of sinking to lower the bucket or skip further.
- Bucket steady** (8) A bucket shall not be allowed to leave the top or bottom of any shaft or winze until the worker in charge has steadied it or caused it to be steady.
- Dumping bucket** **16.13** In a shaft or winze sinking operation (1) Provisions shall be made and maintained to ensure that the bucket or skip is not dumped while the dumping doors are open, or other means shall be applied to prevent spillage falling into the shaft or winze.
- Compartment doors** (2) A door or doors to cover the sinking compartments shall be maintained at the collar or other points of service of every shaft or winze while sinking is in progress.
- Doors closed** (3) Workers shall keep the door or doors covering the shaft or winze closed at all times
- (a) when tools or material are being loaded into or unloaded from the bucket or skip at the collar or other points of service of the shaft, except when the bucket or skip is unloaded by a dumping arrangement as provided in subsection (1), and
- (b) when people are loaded or unloaded, except where a safety crosshead fills the compartment at the collar or other points of service.
- Signal lights** (4) Dual lights shall be installed to indicate to the hoist operator that
- (a) crosshead and bucket are descending together from the bucket-dumping position,

- (b) the service doors are in or out of the shaft compartment, and
  - (c) the dump doors are in or out of the shaft compartment.
- Crosshead** (5) Once the shaft bottom has reached 100 m (330 ft.) from the head sheave, a crosshead shall be provided that
- (a) lands on at least two chairs when at the bottom stop,
  - (b) is attached to a safety device that stops the bucket if the crosshead jams, and
  - (c) encloses the bucket unless the bucket is barrel-shaped and the shaft compartment is tightly lined.
- Crosshead bucket** (6) When a closed type of crosshead is not used the bucket shall be barrel-shaped, at least 1 m (3.3 ft.) high and suspended by the upper rim.
- Sinking crosshead** (7) A sinking crosshead shall be provided with a safety device for attaching the bucket to the crosshead, so constructed that the crosshead cannot stick in the hoisting compartment without also stopping the bucket.

#### **SHAFT AND HOISTING OPERATIONS**

- Conveyance provided for workers** 16.14 (1) Where a shaft exceeds 100 m (330 ft.) in vertical depth, a shaft conveyance shall be provided for the raising and lowering of workers.
- Conveyance out-of-service** (2) A hoist or conveyance shall not be operated
- (a) unless it has been certified by the manufacturer or a professional engineer for its safe operation, including
    - i. the maximum rope pull,
    - ii. the maximum suspended load, and
    - iii. the maximum unbalanced load, in the case of a friction hoist, and
  - (b) if it is known to be defective or be in an unacceptable state of repair, except for the purposes of correcting the defect.
- Hoist load limit** (3) A hoist shall not be loaded beyond the maximum amount shown on the permit required under subsection (4).
- Permit to operate hoist** (4) A hoist or shaft conveyance shall not be operated, except for testing purposes required to put the hoist into service, unless a permit has been received from the director and a copy is posted in the hoist room.
- Hoist installation** (5) A hoist or conveyance shall be installed, operated and maintained in accordance with the manufacturer's or professional engineer's specifications and these Regulations.
- New / reactivated hoists** (6) Commissioning tests shall be carried out on a new or reactivated mine hoist, before it into service, to ensure compliance with these Regulations and proper functioning of the equipment.
- Hoist test** (7) A professional engineer shall carry out the commissioning tests for a new or reactivated hoist, record and certify the test results, and forward a copy to the director.
- Shaft sumps** 16.15 (1) A bulkhead or other suitable stop shall be placed in every working shaft to prevent that part of the hoisting conveyance carrying people from being inadvertently lowered into water in the sump of the shaft.
- Stope near shaft** (2) A stoping operation shall not be carried out within 30 m (100 ft.) of a shaft that is used for transport of the workers unless written acceptance has been obtained from the director.
- Covered shaft** (3) The top of every shaft or entrance to any underground mine shall be securely fenced or protected by a gate or guardrail.

- Openings on levels** (4) At all shaft and winze openings on the surface and on every level, loading pocket or other shaft opening, unless they are securely closed
- (a) the hoisting compartments shall be protected by a substantial gate that is kept closed except when the hoisting conveyance is being loaded or unloaded at such point, and
  - (b) the clearance beneath any gate shall be kept to a minimum.
- Hoist compartment protection** (5) Where haulage vehicles lead up to any hoisting compartment on surface or underground, a reinforced gate strong enough to withstand any possible collision with any vehicle shall be provided.
- Passageway** (6) A safe passageway and standing room for a worker outside the shaft shall be provided at all working levels and openings into a shaft and the manway shall be directly connected with such openings.
- Partitions at collars** (7) A substantial partition shall be provided at the collar and on all sides of a shaft or winze compartment used for transport of material, except for the loading side.
- Partition size** (8) The partition provided under subsection (7) shall extend a distance not less than the height of the hoisting conveyance plus 1.8 m (6 ft.) above and at least 1.8 m (6 ft.) below the collar at all levels.
- Ladders / conveyance** (9) A suitable ladder-way or an independently powered conveyance shall be provided in every shaft.
- Vertical ladders** (10) Except for an auxiliary ladder used in a shaft-sinking operation, a ladder shall not be installed in a shaft in a vertical position.
- Separate manway** (11) A manway in a shaft shall be separated from the hoisting or counter-weight compartments by a substantial partition.
- Counterweight enclosed** (12) Where a counterweight is used in a shaft or winze, it shall operate in a separate enclosed compartment and be certified by a professional engineer for safe operation.
- Partition strength** (13) Between levels, the partition provided under subsection (11) shall consist of metal of suitable weight and mesh to prevent a falling object from entering the manway or an intrusion of an object from the manway into the hoisting compartment.
- Work in compartment or headframe** (14) A worker shall not work in a part of a compartment or head frame of a shaft or winze that is being used for a hoisting operation, unless the worker is adequately protected from accidental contact with any moving hoisting conveyance and from a danger of falling objects.
- 16.16 Collar doors** (1) When a bucket is used in any shaft or winze for other than sinking purposes
- (c) a set of doors shall be installed and maintained at the collar of the shaft or winze, and be kept closed at all times except when tools or supplies are being loaded into or taken out of the bucket,
- Landing device** (c) a suitable landing device shall be used at every working level if the bucket is to be loaded or unloaded at that level, and
- Simultaneous operations** (c) simultaneous operations shall not be carried out at more than one level.
- Shaft work platforms** (2) Where a work platform that is not a shaft conveyance is used to transport or support workers performing in a shaft, the work platform shall be
- (a) designed by a professional engineer, and
  - (b) built and used in accordance with the design and instructions.

## MINE HOISTING PLANT

- Design, installation**      **16.17**    (1) A mine hoisting plant shall be designed, installed, operated and maintained in accordance with specifications from the manufacturer of the equipment and system, or from a professional engineer.
- Hoisting plant permit**      (2) Except for the purpose of testing before being put into service in a particular location, no mine hoisting plant shall be operated without a valid mine hoisting plant permit issued by the director.
- (3) The permit prescribed by subsection (2)
- (a) shall be obtained from the director upon receipt of certification obtained from a professional engineer, and
- (b) may be cancelled if the mine hoisting plant is not installed, maintained and operated in compliance with the *Occupational Health and Safety Act* and these Regulations, the instructions of a professional engineer and the specifications of the manufacturer.
- Conveyance permit**      (4) A copy of the permit issued for the operation of the shaft conveyance, stating the loads and the number of persons allowed to ride in the shaft conveyance, shall be posted at the shaft house and shaft collar.
- Conveyance loading**      (5) A shaft conveyance shall not be loaded in excess of the maximum number of persons or weight stated in the permit.
- Conveyance rating plate**      (6) A capacity rating plate stating the maximum number of workers and the maximum weight of the load shall be fixed to the conveyance in a clearly visible location.
- Compliance with regulations**      (7) A check for compliance with the applicable regulations shall be conducted on a mine hoisting plant before putting it into initial service in a particular location.
- Application for permits**    **16.18**    A professional engineer preparing an application for a permit shall give proper consideration to ensure that
- (a) the maximum weight to be transported in the conveyance does not exceed the load the mine hoisting plant is capable of carrying safely,
- (b) the maximum number of persons allowed in a shaft conveyance does not exceed 85 percent of the rated maximum weight divided by 90 kilograms (225 lbs.),
- (c) subject to subsection (b), the maximum number of persons that can be carried on a shaft conveyance is determined as follows:
- i. where the clear floor area of a deck of a shaft conveyance is 1.86 sq. m (20 sq. ft.) or less, there shall be at least 0.20 sq. m (2 sq. ft.) for each person,
- ii. where the clear floor area of a deck of a shaft conveyance is more than 1.86 sq. m (20 sq. ft.) and less than 4.64 sq. m (50 sq. ft.), there shall be at least 0.15 sq. m (1.6 sq. ft.) for each person, and
- iii. where the clear floor area of a deck of a shaft conveyance is 4.64 sq. m (50 sq. ft.) or more, there shall be at least 0.14 sq. m (1.5 sq. ft.) for each person, and
- Log books**      (d) the following log books shall be obtained and used for each mine hoisting plant:
- i. Electrical Hoisting Equipment Record Book,
- ii. Hoisting Machinery Record Book,
- iii. Hoist Operator's Log Book,
- iv. Rope Record Book, and
- v. Shaft Inspection Record Book.

	<b>16.19</b>	A headframe on the surface or underground in an underground mine or project shall be
<b>Headframe design</b>	(a)	designed and certified for safe operation by a professional engineer with appropriate drawings and specifications available for review,
<b>Headframe installation</b>	(b)	fabricated, installed, operated and maintained in accordance with the procedures and specifications issued by a professional engineer,
<b>Headframe strength</b>	(c)	of sufficient strength to safely withstand all loads to which it is likely to be subjected, and
<b>Headframe height</b>	(d)	of sufficient height to provide an adequate distance for an overwind that exceeds the greater of twice the stopping distance of the hoist at the maximum speed permitted by the hoist controls, or 3 m (10 ft.).
	<b>16.20</b>	(1) A mine shaft shall
<b>Shaft design</b>	(a)	be designed by a professional engineer in accordance with established engineering principles,
<b>Conveyance guides</b>	(b)	have a means to guide each shaft conveyance to prevent contact with another shaft conveyance or shaft furnishings, and
<b>Underwind clearances</b>	(c)	have underwind clearances that exceed the stopping distance of the shaft conveyance when travelling at the maximum speed permitted by the hoist controls, except <ul style="list-style-type: none"> <li>i. during shaft-sinking, or</li> <li>ii. when chairs are used to land a skip during loading.</li> </ul>
<b>Friction hoist</b>	(2)	Where a friction hoist is installed in a mine shaft, it shall have tapered guides or other such devices above and below the limits of regular travel of the shaft conveyance and counterweight, and they shall be arranged to act as a direct physical brake to decelerate and stop the counterweight and shaft conveyance in the event of an overtravel.
<b>Intermediate shaft obstruction</b>	<b>16.21</b>	(1) Protective devices shall be installed and safe procedures developed and followed to prevent a shaft conveyance or counterweight from coming into contact with any kind of an intermediate shaft obstruction.
	(2)	A device that may become an intermediate shaft obstruction shall be positively locked out of the shaft compartment to prevent inadvertent entry into the compartment.
	(3)	The location of the intermediate shaft obstruction shall be marked on the depth indicator of a hoist.
	(4)	The protective procedure for operating the intermediate shaft obstruction shall be prepared in writing and posted for use by the hoist operator.
	(5)	Where doors are used for covering the shaft at the collar to facilitate maintenance of a shaft conveyance <ul style="list-style-type: none"> <li>(a) they shall be positively latched out of the shaft compartments when not in use, and</li> <li>(b) dual lights shall be installed to indicate to the hoist operator whether such doors are in or out of the shaft compartment.</li> </ul>
<b>Hoist brakes</b>	<b>16.22</b>	(1) A hoist used for transporting workers shall have a braking system consisting of at least two sets of mechanical brakes to stop and hold the drum for the shaft conveyance transporting the workers.
<b>Mechanical brakes</b>	(2)	Each set of mechanical brakes on the drum shall <ul style="list-style-type: none"> <li>(a) stop and hold the drum when the shaft conveyance or counterweight is operating at its maximum load,</li> <li>(b) be designed and installed to be tested independently, and</li> <li>(c) be designed to apply normal braking effort before a linkage or brake piston reaches a limit of travel.</li> </ul>

- (3) At least one of the mechanical brakes shall be designed and arranged to
    - (a) apply directly to the drum, and
    - (b) apply automatically when
      - i. the safety circuit of the hoist is interrupted, or
      - ii. the pressure in the hydraulic or pneumatic system for applying brakes has dropped below normal.
- Hoist brake design**
- (4) The braking system on a drum hoist shall be designed and arranged so that
    - (a) the brakes are applied by control levers that are pulled, unless the brake and power control are on a common lever, and
    - (b) any brake weights installed to provide auxiliary braking force can be readily tested for freedom of movement.
  - (5) Brakes of a drum hoist shall be designed and arranged to decelerate the hoist at a rate greater than 1.5 metres per second (5 ft. per sec.) and less than 3.7 metres per second (12 ft. per sec.) where the braking is initiated by an interrupted safety circuit and the hoist is
    - (a) normally used for the transport of workers, and
    - (b) operating in the normal full-speed zone.
  - (6) The braking system of a hoist not normally used to transport workers shall be designed and arranged to safely stop and hold the hoist under all conditions of normal load, speed and direction of travel.
- Hoist drum clutch**
- (7) A clutch of a drum hoist shall be interlocked with the brake so that
    - (a) the clutch can be disengaged only when the brake of the drum is fully applied, and
    - (b) the clutch is fully engaged before the brake of the drum can be released.
- Clutch controls**
- (8) The controls for engaging and disengaging a clutch shall be guarded to prevent their inadvertent operation.
- Band-type clutch prohibited**
- (9) Band-type friction clutches shall not be used on a drum hoist.
- Rope to drum ratios**      **16.23**
- (1) The drum diameter to rope diameter ratio for a drum hoist shall be equal to or greater than
    - (a) 60 to 1, where the nominal rope diameter is 0.0254 m (1 in.) or less, or
    - (b) 80 to 1, where the nominal rope diameter is greater than 0.0254 m (1 in.).
  - (2) The drum diameter to rope diameter ratio for a drum hoist in use for shaft-sinking or for preliminary development work during shaft-sinking shall be equal to or greater than
    - (a) 48 to 1, where the nominal rope diameter is 0.0254 m (1 in.) or less, or
    - (b) 60 to 1, where the nominal rope diameter is greater than 0.0254 m (1 in.).
  - (3) The drum diameter to rope diameter ratio of a friction hoist shall be equal to or greater than
    - (a) 80 to 1, for stranded ropes, or
    - (b) 100 to 1, for locked coil ropes.
- Rope on drum**      **16.24**
- (1) No drum hoist shall have
    - (a) more than three layers of rope where the drum has helical or spiral grooving or does not have grooving,
    - (b) more than four layers of rope if the drum has parallel and half-pitch grooving, and
    - (c) less than three dead turns of the rope on the drum.

- Hoist drums** (2) The drum of a drum hoist shall be equipped with
- (a) grooves that properly fit the rope, unless the hoist is being used for shaft-sinking or preliminary development work during shaft-sinking, in which case the drum may be smooth, and
  - (b) flanges of sufficient height to contain all the rope and strong enough to withstand any loading by the rope.
- Conical drums** (3) A conical drum hoist shall be provided with grooves that prevent the rope from slipping off.
- Hoist and sheaves** (4) A drum hoist and a sheave shall be designed and arranged so that the rope
- (a) coils properly across the face of the drum,
  - (b) winds smoothly from one layer to another, and
  - (c) winds without cutting into the rope layer beneath.
- Hoist bolts and fittings** (5) Bolts and other fittings of a mine hoisting plant shall be secured.
- Depth indicators** **16.25** (1) A hoist shall be provided with depth indicators that continuously, accurately, and clearly indicate to the hoist operator the position
- (a) of a shaft conveyance and counterweight, if any,
  - (b) in an inclined shaft, of a change in gradient that requires a reduction in hoist speed,
  - (c) at which the overwind, underwind and track limit devices are set to operate,
  - (d) of any intermediate shaft obstruction,
  - (e) of the limits of normal travel for the shaft conveyance and counterweight, if any, and
  - (f) of any collar doors, dump doors, and crosshead landing chairs.
- Steam and air powered hoists** (2) A steam or air-powered hoist shall be provided with devices that
- (a) protect against an overwind,
  - (b) protect against an underwind, except during shaft-sinking,
  - (c) indicate the air or steam pressure for the hoist operator, and
  - (d) permit the air or steam supply to the hoist engine to be readily shut off by the hoist operator.
- Engine compression for brakes** (3) Where the hoisting plant consists of a single shaft conveyance without a counterweight, the compression of the engine of an air or steam-powered hoist shall be used as an automatic brake only if
- (a) the engine is non-reversing,
  - (b) the exhaust restraining valve is fail-safe,
  - (c) the piping system is strong enough to withstand the air or steam pressures,
  - (d) the compression has sufficient braking capacity to stop the hoist carrying its maximum load,
  - (e) the normal speed of the hoist is less than 2.5 metres per second (8 ft. per sec.), and
  - (f) specifications and arrangement of the hoist have been submitted to and accepted by the director.
- Tuggers** (4) A hoist being used as a tugger or utility hoist shall be maintained and used so as not to endanger the safety of a worker.
- Sheaves certified** (5) Before a sheave is used, a certificate for the sheave shall be obtained from the manufacturer of the sheave or a professional engineer competent in sheave design certifying as to
- (a) the maximum rated load,
  - (b) the diameter of rope for which it was designed,

- (c) the breaking strength of the rope for which it was designed, and
  - (d) the maximum amount of groove wear that is permitted on the sheave.
- Sheave use**
- (6) No sheave shall be
    - (a) loaded above the maximum rated load, or
    - (b) used other than in compliance with the certificate.
- Sheave to rope ratio**
- (7) The ratio of the diameter of a sheave to the diameter of the rope shall be the same as specified for drums in section 16.23.
- Sheave details**
- (8) A sheave shall
    - (a) be made of materials that safely withstand the ambient temperatures,
    - (b) be fitted with a groove to fit the rope being used, and
    - (c) bear a serial number and the date of its manufacture.
- Sheave shafts**
- (9) A sheave shaft shall be examined for possible flaws by a competent person using a non-destructive testing technique
    - (a) before being put into service in a particular location,
    - (b) after installation, and
    - (c) at a regular frequency as recommended by a competent person in such testing.
- Shaft rope test**                    **16.26**
- (1) No shaft rope shall be used or reinstalled unless
    - (a) a 2.5 m (8 ft.) representative sample has been tested for its breaking strength, percentage elongation at failure and torsion test results on individual wire through destructive test, and
    - (b) a Certificate of Test has been issued by the cable testing laboratory with the information required under subsection (1)(a).
- Periodic rope test**
- (2) After 18 months of initial service by a rope on a drum hoist and thereafter at every six-month interval, a 2.5 m (8 ft.) length of rope shall be cut from the lower end of the rope, above any clamps or attachments, and sent for destructive testing to a laboratory capable of measuring the breaking strength, percentage elongation at failure and torsion test results on the individual wires, except in the case of the rope tested by an electromagnetic testing device as permitted under subsection (6).
- Cutting rope**
- (3) The length of the rope cut for test shall have its ends fastened with binding wire before the cut is made to prevent the disturbance or loosening of the strands.
- Rope test certificate**
- (4) A copy of the certificate of the test shall be forwarded to the director with an appropriate summary of the test results in a Rope Record Book.
- Hoist rope certification**
- (5) No hoisting rope that has been used, stored or in and out of use for 24 months shall be used or put in use until it has been certified as safe by a professional engineer.
- Electromagnetic tests**
- (6) A competent person shall test each shaft-hoisting rope on drum hoists and friction hoists throughout its working length using an electromagnetic testing device
    - (a) within the first six months of service and thereafter at an interval of not longer than six months,
    - (b) at an interval of less than six months if the extrapolated loss of breaking strength from earlier tests is expected to be greater than 10 percent before the next regular test,
    - (c) at an interval of four months if the rope has been in service for longer than 24 months, and
    - (d) and a test results record book shall be kept with all test results recorded in it and a copy of the test results shall be submitted to the

director within 28 days, and where the loss of strength is more than 7.5 percent, within 14 days.

- Rope record book** (7) The dates and results of the electromagnetic tests shall be entered in a Rope Record Book.

#### **ROPE ATTACHMENTS**

- Closed-type** 16.27 (1) Shaft ropes shall be attached by closed-type devices that will not disconnect inadvertently.
- Drum hoist ropes** (2) In a drum hoist installation, the hoisting ropes from the shaft conveyance and the counterweight shall be attached to the drum of the hoist.
- Safety factor** (3) Any connections between shaft conveyances and components of the suspension gear between a hoisting rope or tail rope and the shaft conveyance and/or counterweight shall have a static safety factor of not less than 10 when new.
- Wedge attachments** (4) No wedge-type attachments shall be used unless the attachments are  
(a) in sound condition, and  
(b) certified at least once every six years of use as being in sound condition by a qualified person or by the manufacturer.
- Minimum wraps of rope** (5) When the conveyance is at the lowest hoisting position in a shaft, at least three wraps of rope shall be left on the drum of a drum hoist.
- Attachment tests** (6) When the attachments for a shaft-hoisting rope are first installed, or re-installed after disassembling, the following procedures shall be followed before the hoist is put into service:  
(a) two test trips of the conveyance or counterweight shall be made through the working part of the shaft while the conveyance or counterweight is carrying the maximum load,  
(b) upon the completion of the test trips the attachments shall be examined, and necessary adjustments made, and  
(c) the person or persons involved in the examination shall keep a record of the examinations, findings and adjustments in the Hoisting Machinery Record Book.
- Rope clips** (7) Where shaft rope attachments are made using rope clips, the number of clips to be used and their torque shall be in accordance with the requirements of the rope manufacturer and a professional engineer.

#### **SKIPS AND CAGES**

- Safety catches** 16.28 A cage being used to transport workers shall  
(a) where supported by only a single rope or attachment point, be equipped with safety catches and mechanisms that  
i. stop and hold a skip or cage if the support rope or attachment should break, and  
ii. are tested in accordance with subsection (b), (c), and (d) prior to the first use to transport workers and prior to returning to service after repairs,
- Free-fall tests** (b) have free-fall tests performed on the safety catches and mechanisms in the following manner:  
i. the cage or skip shall carry a weight equal to its maximum permitted load,

- ii. the cage or skip shall travel at a speed equal to normal hoisting speed when transporting persons, and
  - iii. the guides on which the test is made shall be representative of those in the shaft,
- Test report** (c) have a report of the free-fall test submitted to the director and the results recorded in the Hoisting Machinery Record Book for the hoist,
- Test requirements** (d) have a free-fall test that ensures
- i. the skip or cage decelerates to a stop within one and three times the rate of gravity,
  - ii. the safety dogs and mechanisms are not damaged,
  - iii. the safety dogs engage the guides constantly during deceleration, and
  - iv. a calculation shows that the safety dogs will stop the cage or skip when it is carrying its maximum material load, and
- Safety catch tests** (e) have the safety catches and mechanisms of the cage or other shaft conveyance tested at least once every six months and
- i. such tests shall consist of releasing the empty conveyance suddenly in some suitable manner from rest, so that the safety catches have the opportunity to grip the guides, and
  - ii. where the safety catches do not act satisfactorily, the cage or other shaft conveyance shall not be used for lowering or raising workers until the safety catches have been repaired and tested and shown to operate satisfactorily.
- Skip and cage specifications** **16.29** A skip or cage being used to transport workers shall have
- (a) the sides enclosed by sheet steel at least 0.003 m ( $\frac{1}{8}$  in.) thick on all sides, except the door side,
  - (b) adequate ventilation for the maximum number of workers allowed to be transported,
  - (c) a hood of steel plate at least 0.005 m ( $\frac{1}{5}$  in.) thick,
  - (d) a door or doors that
    - i. are at least 1.5 m (5 ft.) high,
    - ii. are mounted and arranged so they cannot be opened outward from the cage,
    - iii. have devices for positive latching in the closed positions,
    - iv. are built of solid materials, except for a viewing window,
    - v. are so arranged that they may be closed at all times that persons or materials, except rolling stock, are being transported in the cage,
    - vi. are mounted so as to provide only enough clearance at the floor to permit free closing or opening, and
    - vii. are of adequate strength to withstand normal shock loads,
  - (e) an internal height greater than 2.1 m (7 ft.),
  - (f) a clearance at the door that is greater than 1.8 m (6 ft.),
  - (g) an exit in the roof which can be opened from inside and outside the cage, and
  - (h) the shaft signal pull cord located in a convenient place for the skip tender.
- Control devices** **16.30** When a skip or cage is being used to carry workers
- (a) the hoist shall be equipped with control devices that prevent the skip or cage from being taken
    - i. to the dump position, and
    - ii. to the skip loading pocket, unless the controls for loading the skip with ore or waste have been made inoperative,
- Hoist speed** (b) the hoist shall not travel in excess of one-half its normal speed and in no case shall the speed be permitted to exceed 5 m per second (16.4 ft. per sec.)

- Fail-safe devices** (c) the control devices of the hoist shall be designed and installed to be fail-safe,
- Control device signal** (d) an audible or visual signal, indicating that the control device for the hoist is set in operation, shall be given to the workers entering or in a skip or cage,
- Landing chairs** (e) chairs used for landing a cage shall be
  - i. arranged to fall clear and remain clear of the shaft compartment when the cage is lifted off the chairs,
  - ii. operable only from the outside of the cage, and
  - iii. so arranged as not to distort the cage, and
- (f) chairs fastened to shaft station posts shall be of a chain type.

### **ELECTRIC HOISTS**

- Safety circuit** **16.31** (1) A hoist that is electrically powered shall be equipped with a safety circuit that
  - (a) is fail-safe,
  - (b) has a protective electrical circuit operating at a nominal potential not exceeding 250 volts, and
  - (c) when interrupted, operates to
    - i. set the brakes,
    - ii. remove the power from the hoist motor or motors, and
    - iii. stop the mine hoist when in motion.
- Safety circuit interruption** (2) The safety circuit of an electric hoist shall be interrupted when
  - (a) there is a failure of power supply to the hoist electrical system that may affect safe operation,
  - (b) there is an overload on the hoist motors of a magnitude and duration exceeding normal,
  - (c) there is a short circuit in the hoist electrical system, or
  - (d) a prescribed safety device has operated or activated.
- Safety circuit switch** (3) A switch to interrupt the safety circuit of a hoist shall be installed and the switch shall be
  - (a) manually operable,
  - (b) located within easy reach of the hoist operator when at the controls,
  - (c) readily recognizable, and
  - (d) readily operable.
- Track limit device** (4) A track limit device shall be installed in each shaft compartment that is operated directly by the shaft conveyance or counterweight to interrupt the safety circuit of a hoist in the case of an overwound shaft conveyance or counterweight.
- Safety devices** (5) Devices shall be installed to protect a shaft conveyance or counterweight against
  - (a) an overwind, and
  - (b) an underwind, except during shaft-sinking, and
  - (c) approaching the limits of travel at an excessive speed, or
  - (d) operating or being operated at an overspeed in excess of that for which the hoisting plant was designed and intended.
- (6) The devices required by subsection (5) shall
  - (a) operate to interrupt the safety circuit when activated,
  - (b) be driven directly by the drum,
  - (c) be protected from the loss of motion,
  - (d) prevent the paying out of excess rope during shaft-sinking, and

- (e) be set to stop the hoist before a shaft conveyance, counterweight and their attachments make contact with a fixed part of a mine shaft or headframe.

- 16.32** On a friction hoist
- Friction hoist safety circuit** (a) devices shall be installed to interrupt the safety circuit when
    - i. excessive slip between the drum and a hoisting rope or ropes occurs,
    - ii. a violent swing or large rise in the loop of a balance rope occurs, or
    - iii. a shaft conveyance and counterweight approaches the collar of a mine shaft at excessive speed,
  - Safety devices synchronized** (b) a device shall be installed that synchronizes the position of the shaft conveyance with the safety devices driven from the hoist drum, and
  - (c) the device required under section 16.32(a)(iii) shall be installed in the mine shaft.
- 16.33** A hoist that is electrically powered shall have
- Ammeter** (a) an ammeter within plain view of the hoist operator to indicate the hoist motor current,
  - Warning device** (b) an audible warning device to warn the operator that the hoist is at a point where manual braking must begin, except where automatic retardation controls are installed at the limits of travel,
  - Speed indicator** (c) a speed indicator, if the normal rope speed exceeds 2.5 m per second (8 ft. per sec.),
  - Voltage reading** (d) a device from which a voltage reading proportioned to the speed of the hoist can be obtained,
  - Back-out device** (e) a manually operated back-out device that can remove a shaft conveyance or counterweight from an overwound or underwound position and prevents the brakes from being released until sufficient torque has been developed to ensure movement in the right direction,
  - Bypass devices** (f) the underwind or overwind bypass devices so designed and arranged that they are
    - i. manually operable only, and
    - ii. able to restrict the hoist operation to slow speed,
  - Overwind bypass** (g) the overwind bypass devices arranged such that they allow hoist travel only beyond the first device provided for overwind protection,
  - Master controller** (h) a master controller that has a neutral or brake reset position,
  - Brake levers** (i) brake operating levers so arranged that upon an interruption of the safety circuit the power cannot be restored to the hoist until the levers are in the brake-applied position,
  - Safety controllers** (j) accurate and sensitive safety controllers,
  - Effective safety devices** (k) safety-related devices that will be effective under the environmental conditions in which they are installed, and
  - Adjustment to safety devices** (l) any adjustment to a protective device carried out only by a qualified person who is authorized to do so.

#### **SAFETY EXAMINATIONS AND CERTIFICATES**

- 16.34** (1) A qualified person shall be appointed to examine an electrically powered or controlled hoist at least once each week, and shall examine the
- (a) hoist motors,
  - (b) hoist controls,
  - (c) electrical safety devices, and
  - (d) signalling devices.

- (2) A record of the examination and any subsequent servicing and repair shall be entered in the Electrical Hoisting Equipment Record Book, and the entries shall be dated and signed by the qualified person.
- (3) The supervisor in charge shall record failures or accidents involving an electrical component of a hoist motor and controls and electrical safety and signalling devices in the Electrical Hoisting Equipment Record Book.
- (4) The supervisor in charge of the mine hoisting plant shall
  - (a) at least once each week, review the entries made in the Electrical Hoisting Equipment Record Book during the preceding week,
  - (b) ascertain that the examinations prescribed in subsection (1) have been made and all necessary work has been done to make them operate safely, and
  - (c) upon completion of each review required by (a), certify in the Electrical Hoisting Equipment Record Book that (a) and (b) have been done.

**Mine hoisting plant examination**

**16.35**

A qualified person shall be appointed to examine the mine hoisting plant and record such examinations in the appropriate log book as described in section 16.18(d), as follows:

**Daily**

- (1) At least once in each normal production day, the appointed person shall examine
  - (a) the exterior of each hoisting and tail rope to detect the presence of kinks or other damage and to note the appearance of the rope dressings, and
  - (b) the safety catches of the shaft conveyance for any defects.

**Weekly**

- (2) At least once in each week, the appointed person shall examine
  - (a) any conveyance safety mechanisms for proper adjustment and freedom of movement,
  - (b) any head, deflection or idler sheaves, their shafting and bearer and sole plates,
  - (c) the attachments of each shaft rope,
  - (d) the attachments on any shaft conveyance or counterweight,
  - (e) any shaft conveyance, counterweight, and work platform,
  - (f) the hoist parts, brakes, brake-clutch interlocks, and depth indicators,
  - (g) any hoisting equipment being used shaft-sinking, and
  - (h) any auxiliary brake operating weights to assure their freedom of movement and holding capacity.

**Monthly**

- (3) At least once each month, the appointed person shall examine
  - (a) the shaft ropes to determine the
    - i. amount of wear, distortion and corrosion,
    - ii. need for lubrication, and
    - iii. need for changing the wear patterns,
  - (b) the hoisting ropes for the number and location of broken wires, and
  - (c) the friction treads of a friction hoist.

**Every six months of service**

- (4) At least once every six months of service, the appointed person shall examine
  - (a) the hoisting rope of a drum hoist contained within the attachments at the drum and at the drum spout, and
  - (b) the hoisting rope of a friction hoist contained within the attachments at the shaft conveyance or counterweight in accordance with an established procedure.

**Every twelve months**

- (5) At least once every 12 months, the appointed person shall examine

- (a) the bolt-locking devices, foundation bolts and all bolts critical to hoist safety, and
  - (b) the bails, suspension gear and structure of the shaft conveyance and counterweight.
- Hoisting ropes cleaned**    **16.36**    (1) The hoisting ropes in use on a drum hoist shall
- (a) be cleaned when necessary,
  - (b) be dressed with lubricant at least once each month to maintain a good coating, and
  - (c) have a record kept of the cleaning and dressing in the Hoisting Machinery Record Book, with the entry dated and signed by the supervisor in charge of the work.
- Hoist rope cut off**
- (2) After every six months of service on a drum hoist, the portion of the hoisting rope that is within the clamps at the attachment of a shaft conveyance or counterweight shall be cut off.
  - (3) After every 18 months of service on a friction hoist, the portion of the hoisting rope and tail rope that is within the wedge and socket attachments shall be cut off.
- Shaft and conveyance examination**
- (4) An examination shall be made by a qualified person, using recognized non-destructive methods, to determine the condition of the
    - (a) hoist shafting, brake pins and linkages, and
    - (b) structural parts, attachment pins, and draw-bars of a shaft conveyance and counterweight.
  - (5) The examination referred to in subsection (4) shall be made
    - (a) before initial use of the parts, and
    - (b) at regular intervals that are no greater than
      - i. those recommended by the qualified person performing such an examination, or
      - ii. those required by the manufacturer or a professional engineer.
  - (6) Drawings of the parts to be examined under subsection (4) shall be made available to the worker performing the examination.
  - (7) A record of the examination required by subsection (4) and any servicing and repairs shall be entered in the Hoisting Machinery Record Book and the entries shall be
    - (a) dated and signed by the worker performing the examination, servicing, or repairs, and
    - (b) countersigned by the supervisor in charge of the mechanical parts of the hoisting plant.
- Record of failure / accident**
- (8) A record of a failure and accident involving a mechanical part of a hoisting plant shall be made in the Hoisting Machinery Record Book by the supervisor in charge of the mechanical hoisting equipment.
- Record book entries reviewed**
- (9) The supervisor in charge of the hoisting plant shall
    - (a) at least once each week, review the entries made in the Hoisting Machinery Record Book during the preceding week,
    - (b) ascertain that the examinations required by this section have been made and all necessary work done to correct the situation if required, and
    - (c) upon completion of the review required by (a), certify in the Hoisting Machinery Record Book that (a) and (b) have been done.
- Mine shaft examination**    **16.37**    (1) A competent person shall examine
- (a) the mine shaft at least once every week,

<b>Shaft component examination</b>	(b) the shaft guides, timbers, walls and compartments used for hoisting at least once every month,
<b>Headframe examination</b>	(c) the headframe, headframe foundation and backlegs, sheave deck, dump, bin and bin supports at least once every year,
<b>Shaft sump examination</b>	(d) the shaft sump, at such frequency as is necessary to assure that the tail, guide and rubbing rope connections are clear of water and spillage,
<b>Sump water examination</b>	(e) water in the shaft sump at least once every year to determine its pH, and
<b>Tugger examination</b>	(f) the ropes, sheaves, brakes, attachments and other parts of a utility or tugger hoist regularly and keeps them in safe condition.
<b>Examination records</b>	(2) All examinations required by this section, and any servicing and repairs, shall be entered in the Shaft Inspection Record Book and <ul style="list-style-type: none"> <li>(a) the entries shall be dated and signed by the worker performing the examination, servicing or repairs, and</li> <li>(b) the entries shall be countersigned by the supervisor in charge of the mine shaft and headframe.</li> </ul>
	<b>16.38</b> (1) A certificate for each hoist shall be obtained from the manufacturer of the hoist or a professional engineer competent in the design of mine hoisting plants certifying <ul style="list-style-type: none"> <li>(a) the maximum rope pull,</li> <li>(b) the maximum suspended load, and</li> <li>(c) the maximum unbalanced load in the case of a friction hoist.</li> </ul>
<b>Conveyance certificate</b>	(2) A certificate shall be available for each shaft conveyance or counterweight showing its <ul style="list-style-type: none"> <li>(a) rated load, as certified by a professional engineer, and</li> <li>(b) serial number, date of manufacture and name of the manufacturer.</li> </ul>
<b>Conveyance examination</b>	(3) Each shaft conveyance and counterweight shall be examined and inspected at least once in every five years of use by a qualified person and a record of such examination and inspection kept available for inspection.
<b>Conveyance safety factor</b>	(4) All parts of a shaft conveyance or counterweight when in service and carrying the rated load shall be capable of withstanding at least four times the maximum allowable design stresses without permanent distortion.
<b>Conveyance design stresses</b>	(5) The maximum allowable design stresses shall be set by established engineering principles and include the effects of <ul style="list-style-type: none"> <li>(a) the weight of the conveyance or counterweight,</li> <li>(b) the rated load,</li> <li>(c) any impact load,</li> <li>(d) any dynamic load,</li> <li>(e) stress concentration factors,</li> <li>(f) corrosion,</li> <li>(g) metal fatigue, and</li> <li>(h) dissimilar materials.</li> </ul>
<b>Work on top of conveyance</b>	(6) Where a worker performs work from the top of a shaft conveyance or counterweight, the following shall be provided for the worker: <ul style="list-style-type: none"> <li>(a) safe footing, and</li> <li>(b) overhead protection, except when changing shaft guides.</li> </ul>
<b>Material secure in conveyance</b>	(7) Devices shall be provided in a shaft conveyance by which any equipment or supplies within the conveyance may be safety secured.

## COMMUNICATION

- Voice communication**    **16.39**    (1) A system for voice communication shall be installed and maintained at an underground mine.
- Communication points**                    (2) The communication system required by subsection (1) shall permit communication between persons at
- (a) the collar of the shaft, including the collar of an internal shaft,
  - (b) the landing stations in use in a shaft,
  - (c) the hoist room for the shaft, including the hoist room for an internal shaft,
  - (d) an underground refuge station, and
  - (e) an attended place on surface.
- Distinct signals**                            (3) Every working shaft shall be equipped with a means of communicating from the bottom of the shaft, collar, and each landing using distinct and definite signals to the hoist room.
- Separate signals**                            (4) A separate audible signal system shall be installed for the control of each hoisting conveyance operated from a single hoist and there shall be a sufficient difference in the signals to the hoist operator so that they are easily distinguishable.
- Return signal**                                (5) Where an electrical signal system is installed, the hoist operator shall return the signal to the worker originating the signal when workers are about to be hoisted or lowered.
- Director acceptance**                        (6) No device for signalling to or communicating with the hoist operator shall be installed or operated in or on any shaft conveyance without the written acceptance of the director.
- Signal code**                                 **16.40**    (1) The code of signals set out in Table 16-1 at the end of this Part shall be used at every mine and a copy of the code posted in every hoist room and at every level or other recognized landing place in every working shaft or winze.
- 3-bell signal**                                 (2) When the conveyance arrives at a station, the hoist operator shall give a three-bell signal that must be returned by the cagetender before workers are permitted to enter or leave the conveyance.
- Delay in moving conveyance**            (3) When workers are carried in a hoisting conveyance, the hoist operator shall not
- (a) move the hoisting conveyance within a period of five seconds after receiving a signal indicating movement, and
  - (b) move the hoisting conveyance before receiving another complete signal if the operator is unable to act within one minute of receiving any complete signal.
- Operator at controls**                        (4) After a hoist operator has received a three-bell signal, the operator shall remain at the hoist controls until the signal requesting the movement required and then shall complete the movement.
- Movement complete**                        (5) After commencing the movement, the hoist operator shall complete it without interruption unless he or she receives a stop signal, or in case of emergency.

## HOIST OPERATORS

- Medical certificate**                        **16.41**    (1) No worker shall operate or be permitted to operate a hoist, unless that worker

- Competent person**
  - (a) holds a current Hoist Operator's Medical Certificate, and
  - (b) is a competent person, or
  - (c) is under the direct supervision of a competent person if the worker is being trained to operate the hoist.
  
- Medical exam**
  - (2) A worker operating a hoist shall
    - (a) be examined by a qualified medical practitioner before commencing work as a hoist operator and every 12 months thereafter, and
    - (b) obtain a Hoist Operator's Medical Certificate certifying fitness to operate a hoist.
  
- Medical certificate available**
  - (3) A Hoist Operator's Medical Certificate shall be
    - (a) kept available for inspection, and
    - (b) renewed every 12 months after its date of issue.
  
- Log book**
  - (4) For each shift, a hoist operator shall record in a Hoist Operator's Log Book the following:
    - (a) the working condition of
      - i. the hoist brakes, clutches and clutch brake interlocks,
      - ii. the depth indicator,
      - iii. the signal system,
      - iv. the hoist controls,
      - v. the overwind and underwind devices, and
      - vi. other devices which may affect safe hoist operation,
    - (b) any instructions given to the operator affecting hoist operations,
    - (c) any unusual circumstances in connection with the operation of the hoist,
    - (d) the results of any tests prescribed by these Regulations,
    - (e) any trial trips,
    - (f) any inadvertent stoppages, and
    - (g) the operator's actual starting and finishing time.
  
- Review of log book**
  - (5) The hoist operator shall
    - (a) review and countersign all entries in the Hoist Operator's Log Book for the preceding two shifts, and
    - (b) sign in the Hoist Operator's Log Book for his or her period of duty.
  
- Instructions in log book**
  - (6) A person issuing instructions to the hoist operator shall record and sign such instructions in the Hoist Operator's Log Book.
  
- Supervisor review of log book**
  - (7) The supervisor in charge of a mine hoist shall review and countersign each working day against the entries made in the Hoist Operator's Log Book for the preceding 24-hour work period.
  
- Log book in hoist room**
  - (8) The Hoist Operator's Log Book shall be kept in the hoist room and be available for inspection.
  
- 16.42 Hoist brake test**
  - A hoist operator shall
    - (a) at the start of each shift test for
      - i. the satisfactory working conditions of the hoist brakes, and
      - ii. the holding capacity of any friction clutch, in accordance with a procedure established for the hoist.
    - (b) at least once in 24 hours of use of a hoist, test the overwind and underwind protective devices by operating the hoist into them,
    - (c) make a return trip of a shaft conveyance
      - i. through the working part of a shaft, if there has been a stoppage in hoisting for a period exceeding two hours, and
      - ii. below any part of a shaft that has been under repair, after the repairs have been completed.
  
- Test overwind**
  
- Return trip through shaft**

- At controls** (d) remain at the hoist controls when the hoist is in motion under manual control,
  - Brakes set when absent** (e) apply the hoist brakes and set the controls to remove power from the hoist motors before leaving the hoist operator's position, except when the hoist is on automatic control,
  - No distractions** (f) not be in voice communication when the hoist is in motion and under manual control, except during an emergency or during maintenance and examination,
  - Two-brake minimum** (g) not operate the hoist to transport any person unless at least two brakes can be applied to stop the hoist drum,
  - No unclutched drum** (h) not lower workers on an unclutched drum,
  - Caution with loads** (i) operate the hoist with caution when heavy loads or irregularly shaped loads are on or under the shaft conveyance,
  - Movements as per signals** (j) complete the hoist movement required by an executive signal after the hoist movement is begun, unless there is a signal to stop or an emergency signal, and  
(k) upon receiving a 3-bell executive signal, remain at the hoist controls unless the hoist movement required by the signal is completed.
- 16.43** No worker shall
- Hoist controls** (a) operate or interfere with devices or controls for operating a hoist unless authorized to do so,
  - Speaking to operator** (b) speak to the hoist operator while they are operating the hoist on manual control, except in an emergency or when the hoist is being repaired, maintained or adjusted,
  - Worker on cage** (c) be on a cage while it is being placed onto or removed from chairs,
  - Work under conveyance** (d) be in, on or under a shaft conveyance or counterweight that is supported by an unclutched drum, unless the conveyance or counterweight is secured in position or as otherwise permitted under these Regulations,
  - Exiting a conveyance** (e) leave a shaft conveyance that has inadvertently stopped at a point other than a shaft station, except upon instruction from an authorized person outside the conveyance,
  - Using chairs** (f) put to use any chairs for landing a cage until
    - i. a signal for chairing has been made and returned, or
    - ii. special arrangements have been made to operate a cage with a car in balance from that location, and
  - Objects in shaft** (g) permit the normal operation of a mine hoist if an object which may be a hazard to the operation of a shaft conveyance or a counterweight has fallen down a mine shaft until
    - i. a shaft inspection or a trial run through the affected part has been made,
    - ii. any obstructions have been removed, and
    - iii. any damage affecting safe operation has been repaired.
- 16.44**
- Notice regarding distraction** (1) A notice shall be posted in the hoist room warning that no person shall speak to the hoist operator while the hoist operator is operating the hoist on manual control, except in an emergency or when the hoist is being repaired, maintained or adjusted.
  - Instructions to operator** (2) The hoist operator shall be instructed in the procedures to follow in operating the hoist and any associated safety devices where there is
    - (a) an intermediate shaft obstruction,
    - (b) an emergency, or
    - (c) an inadvertent hoist stoppage.

- Operator available** (3) A hoist operator shall be available at a mine to manually operate an automatically controlled mine hoist when persons are underground.
- Competent person** (4) A competent person or persons shall be designated to
- (a) give signals,
  - (b) be in charge of a shaft conveyance,
  - (c) maintain discipline amongst persons riding in a shaft conveyance,
  - (d) enforce the load limits for the shaft conveyance, and
  - (e) notify the hoist operator of heavy loads or irregular shaped loads on or under the shaft conveyance.
- Removing workers** (5) Safe procedures shall be developed and adopted for removing a worker from a shaft conveyance that has stopped inadvertently at a place in a shaft other than a shaft station.
- Loads below conveyance** (6) The suspension system or arrangement used to transport equipment or supplies below the shaft conveyance or crosshead shall be capable of withstanding at least four times the maximum allowable design stresses without permanent distortion to any component of the system or arrangement.
- Transporting people** **16.45** No person shall be transported in a shaft conveyance
- (a) that is a cage, unless the cage doors are securely closed,
  - (b) while the hoist that is raising or lowering the shaft conveyance is being used to transport ore or waste,
  - (c) that is a multi-deck cage, where supplies or service rolling stock are being transported, except that persons may be carried on a top deck when
    - i. such materials are carried on another deck,
    - ii. the materials are adequately stored,
    - iii. the doors of the top deck are closed,
    - iv. the combined load does not exceed 85 percent of the material load limit of the conveyance, and
    - v. the scheduled trips for workers have been completed.
  - (d) where personal hand tools or equipment are being transported, unless such tools or equipment are
    - i. protected by guards,
    - ii. secured, and
    - iii. the combined load does not exceed 85 percent of the material load limit of the conveyance,
  - (e) unless a worker authorized to give signals is in charge of the conveyance, and
  - (f) with explosives, supplies or service rolling stock, except where the workers required to handle explosives or supplies or service rolling stock are transported with the explosives, supplies, or service rolling stock if space is provided for the safety of the workers, and the combined load does not exceed 85 percent of the material load limit of the conveyance.

**Table 16-1  
Mine Shaft Signal Code**

**1 bell – Stop Immediately – if in motion**

**1 bell - Hoist**

**2 bells - Lower**

**3 bells - Persons About to Enter or Leave Conveyance**

- (1) The 3-bell signal shall be given before persons are permitted to enter or leave the shaft conveyance.
- (2) Where a return bell signal is installed, the hoist operator shall return the 3-bell signal before persons are permitted to enter or leave the shaft conveyance.
- (3) A hoist operator who has received a 3-bell signal shall remain at the hoist controls until receipt of the signal designating the movement required and completion of the movement.
- (4) The hoist operator shall initiate a 3-bell signal as the shaft conveyance approaches the level.

**4 bells - Blasting Signal**

- (1) The hoist operator shall answer a 4-bell signal by raising the shaft conveyance a few feet and then lowering it slowly.
- (2) Following a 4-bell signal, only a 1-bell signal shall be required to signal for raising workers away from the blast.
- (3) The hoist operator shall remain at the controls until the act of raising has been completed.

**5 bells - Release Signal**

The hoist operator on receiving a 5-bell signal may move the shaft conveyance to another point in the shaft, not a recognized stopping point, and stop it there at his own discretion, but the person giving the release signal shall remain to guard the conveyance until it is moved.

**9 bells - Danger Signal**

This signal shall be given only in case of fire or other danger, and followed by the signal for the level at which the fire or other danger exits.

**1 bell followed by 2 bells - Chairing**

**3 bells followed by 3 bells followed by 1 bell - Hoist Slowly**

**3 bells followed by 3 bells followed by 2 bells - Lower Slowly**

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